

WHAT IS CLAIMED IS:

1. A microscopic imaging apparatus with flat-top distribution of light comprising:

an incident light source for providing an incident light;

5 a diffractive optical element for receiving said incident light and generating a uniform incident light;

a beam-splitter for reflecting said uniform incident light onto at least one target sample and further exciting said target sample to emit a light with optical signals passing through said beam-splitter; and

10 an image sensor for receiving said light with optical signals passing through said beam-splitter to obtain at least one detected image of said sample.

2. The microscopic imaging apparatus as claimed in claim 1, wherein said diffractive optical element has a smooth and continuous surface, and the thickness at the center of the diffractive optical element is less than that of the edges.

3. The microscopic imaging apparatus as claimed in claim 1, wherein said diffractive optical element has a ladder shape.

4. The microscopic imaging apparatus as claimed in claim 1, wherein the intensity of said incident light is a Gaussian distribution, and the incident light is transformed to a light having an intensity of flat-top distribution by passing through said diffractive optical element.

5. The microscopic imaging apparatus as claimed in claim 1 further comprising a tunable filter disposed between said beam splitter and

said image sensor for filtering an image with a specific wavelength.

6. The microscopic imaging apparatus as claimed in claim 5, wherein said tunable filter is a liquid crystal tunable filter (LCTF) or an acoustic-optic tunable filter (AOTF).

5 7. The microscopic imaging apparatus as claimed in claim 1, further comprising a beam expander disposed between said diffractive optical element and said beam-splitter for expanding said uniform incident light.

8. The microscopic imaging apparatus as claimed in claim 1,
10 further comprising an objective lens located between said beam-splitter and said sample for transmitting said detected image and adjusting the magnification ratio of said image.

9. The microscopic imaging apparatus as claimed in claim 1, wherein said diffractive optical element only allows the light with a
15 wavelength in a range of visible light or infrared rays to pass through said diffractive optical element.

10. The microscopic imaging apparatus as claimed in claim 9, wherein said diffractive optical element is made of quartz, polymethyl methacrylate (PMMA), or silicon.

20 11. The microscopic imaging apparatus as claimed in claim 5, further comprising a optical filter disposed between said beam-splitter and said tunable filter for preventing said image sensor from receiving said incident light.

12. The microscopic imaging apparatus as claimed in claim 11,

wherein said optical filter is a high pass filter.

13. The microscopic imaging apparatus as claimed in claim 5,
further comprising an imaging lens mounted between said tunable filter and
said image sensor to facilitate the capture and formation of said detected
5 image on said image sensor.

14. The microscopic imaging apparatus as claimed in claim 1,
wherein said image sensor is a charge coupled device (CCD), an
image-enhanced charge coupled device (ICCD), a photodiode array (PDA),
or a vidicon.

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